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Guide to Science Education Programs

NATIONAL SCIENCE FOUNDATION

Fiscal Year 1979

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Editor, *NSF Bulletin*
Public Information Branch
National Science Foundation
Washington, D.C. 20550

Science Education Directorate
National Science Foundation
Washington, D.C. 20550

NATIONAL SCIENCE FOUNDATION SCIENCE EDUCATION PROGRAMS

The fundamental goal of the Science Education programs of the National Science Foundation is expressed in the Congressional mandate to: "Initiate and support . . . . programs to strengthen . . . . science education programs at all levels." Within that broad goal, the Science Education Directorate addresses four major aims:

First, to assure that the Nation's science education establishment can successfully meet the changing scientific needs of a dynamic society, the Foundation provides support to educational institutions to improve their capabilities to teach science and engineering and to facilitate needed innovations in science education. Second, to ensure an adequate supply of high quality science personnel to meet future demands, the Foundation provides support, through a competitive process, to highly qualified individuals who wish to pursue careers in either the theoretical or applied sciences. Third, programs of research and development are supported in order to develop the new knowledge which will allow the science education activities of the Nation to improve. Finally, programs are supported which seek to reach beyond formal educational institutions and make available to the general population information about science and the scientific process in order to increase citizen knowledge and involvement.

To accomplish these aims, the Science Education Directorate offers grant programs targeted to specific areas of interest. Each program accepts proposals meeting the specifications that are outlined in that program's guidelines. This document provides an overview of the Science Education Directorate's programs. In order to submit a proposal to one of them, it is necessary to obtain that program's guidelines, since each has specific emphases, proposal format, and criteria for eligibility.

The Science Education Directorate will give special emphasis to three important concerns: science for the early adolescent, increased participation of minorities, and increased participation of women in science education and careers. These efforts are implemented through many of the programs described in this document, as well as through special funding activities.

Science for the Early Adolescent. This special emphasis grows out of the Foundation's concern for the improvement of science and mathematics education at the junior high or middle school level and its implications for encouraging early adolescents, particularly minorities and girls, to continue in the study of science and mathematics beyond that point in their education where the majority of students choose not to continue study of these areas. Of particular interest are projects to improve science education for the early adolescent in program areas such as Pre-College Teacher Development and Information Dissemination for Science Education, the preservice teacher training aspects of Comprehensive Assistance to Undergraduate Science Education and Local Course Improvement, and research and development activities focused on this age group in the Research in Science Education and Development in Science Education programs, among others. Additional activities may be announced during the coming year.

Activities for Minorities. The Science Education Directorate has also taken positive action to increase the participation of minorities in science education and science careers. Currently, this action takes two forms. First, a number of programs are aimed exclusively at underrepresented groups. These are the Minority Institutions Science Improvement Program, the Resource Centers for Science and Engineering, the Minority Graduate Fellowships, the Minority

Institutions Graduate Traineeships and the Minorities in Science Program, all of which are described in this document. In addition, appropriate proposals focused on the representation of minorities in science careers are encouraged in all programs described in this document.

Activities for Women. A third special emphasis is women in science and engineering. The focal point of this effort is the Women in Science Program described in this document. In addition, proposers of projects focused on increasing the representation of women in science careers are encouraged to participate in all programs described in this document.

PROGRAM ORGANIZATION

The Directorate has four operating units, one for each of its major aims. Programs are placed in the unit that best fits their primary purpose.

Division of Science Education Resources Inmprovement (SERI)—This Division provides support to strengthen the capabilities of schools, colleges and universities for science education and research training. Programs range from those aimed at institution-wide improvement in the sciences to highly focused projects dealing with a single component of an individual course.

Division of Scientific Personnel Improvement (SPI)—This Division provides support for fellowships, traineeships, science teacher development and student-oriented activities. including programs to increase the entry into the sciences of the physically handicapped, women, and minorities. Programs which emphasize the development of individuals rather than institutions, are the primary responsibility of this Division.

Division of Science Education Development and Research (SEDR)—In contrast to the programs of SPI and SERI, which concentrate on support of individuals and institutions using known mechanisms, the emphasis in SEDR is on activities to develop new knowledge and new means for improving science education at all levels. Programs supported range from basic research in selected areas of science education to the development of specific instructional materials, technologies, and methods. Innovation, transferability, and potential for national impact characterize projects supported by SEDR.

Office of Science and Society (OSS)—The Office of Science and Society supports projects to increase public understanding of science and technology and the role these play in meeting national needs, to increase understanding of the relations between the ethical and human values of society and scientific activities and to improve the availability of scientific knowledge to the public.

Proposals received in any program are checked for eligibility and then evaluated through peer review. Each proposal is read by a number of individuals whose education and experience relate to the proposal content. The primary review criterion is always merit; secondary criteria, such as geographical distribution or type of institution submitting, may also be employed.

The following brief descriptions are not intended to be used as guides for the preparation of proposals. Program guides are identified in the description of each program and should be requested separately. The guides should be carefully followed in the development of proposals. If, after reading the guide, there are questions, contact the individual program directly.

From time to time proposals or inquiries are received about potential projects that do not fully meet the requirements for existing programs, or, in some cases overlap two or more programs. The Directorate will entertain such proposals if the project put forward meets the following conditions:

1. relates to the broad objectives of the Directorate;
2. falls outside the guidelines of existing programs; and
3. shows promise of providing information and experience useful to the Directorate in improving effectiveness of existing programs or in designing new programs for the future.

Proposals meeting these criteria will be considered individually and may be submitted at any time. Prospective applicants must establish initial contact with a Directorate staff member by phone or by a brief letter of inquiry that describes the intended project.

Inside the back cover of this brochure is a complete schedule of Science Education programs for Fiscal Year 1979 listing the expected date of availability of the individual guides, closing dates for receipt of proposals, award announcement dates, the publication numbers, and addresses where the individual guides can be obtained.

Science Education Resources Improvement

In an effort to improve the capabilities of schools, colleges, and universities for education and research training in the sciences, the Division of Science Education Resources Improvement supports the following Programs:

COMPREHENSIVE ASSISTANCE TO UNDERGRADUATE SCIENCE EDUCATION

The program of Comprehensive Assistance to Undergraduate Science Education (CAUSE) is designed to encourage improvement in the quality and effectiveness of undergraduate science education in the Nation's colleges and universities.

The program's primary objectives are to:

- strengthen the undergraduate science education components of 2- and 4-year colleges and universities;
- improve the quality of science instruction at the undergraduate level; and
- enhance institutional capability for self-assessment and continuing updating of their science programs.

To achieve these objectives CAUSE will provide up to $250,000 over 3 years in response to detailed plans from science departments, groups of departments or divisions (including the entire science effort of an institution), or consortia of institutions. Support is intended to result in improvements maintained beyond the actual period of funding.

Any supportable approach to the improvement of undergraduate science education, for science majors or for nonscience students, via traditional or nontraditional courses, curricula, or teaching modes, is eligible. Whether the planned activity is competitive, however, will be determined on the case that is made for it by the proposer.

Proposals will be accepted from any university, 2- or 4-year college, or formally organized consortium of these institutions in the United States or its territories that offers instruction in the sciences at the undergraduate level. In FY 1978, $12.9 million was awarded to 73 institutions.

Request brochure SE 79-30, *Comprehensive Assistance to Undergraduate Science Education*.

MINORITY INSTITUTIONS SCIENCE IMPROVEMENT

The Minority Institutions Science Improvement Program (MISIP) provides support for improvement projects in 2- and 4-year colleges whose enrollments are composed predominantly of American Indian, Black, Mexican-American, Puerto Rican, or other disadvantaged ethnic minorities underrepresented in science.

Support is provided for activities designed to enhance an institution's capacity for developing and maintaining a quality science education program for all of its students and to augment the institution's capability for increasing the flow of underrepresented ethnic minorities into scientific careers.

Specific objectives of the Minority Institutions Science Improvement Program include the following:

- to assist institutions to improve the quality of preparation of their students for graduate work or careers in science;
- to increase the number of minority students graduating with majors in one of the sciences, mathematics, or engineering; and
- to improve the capability of minority institutions in the area of institutional planning and development in science, so that they might compete more effectively in assistance programs not specifically intended for minority groups or institutions.

To quality for Foundation support, a 2- or 4-year minority institution or consortium of such institutions must present a plan for development that can be maintained after grant termination. Renovation of facilities, purchase of equipment, and development of methods of instruction are some elements which may be supported under this program. Three types of grants are available: design grants for up to 12 months and $20,000; institutional and cooperative grants for up to 36 months and $300,000; and special project awards for up to 24 months and $50,000. In FY 1978, $4.7 million was awarded to 28 proposers.

Request brochure SE 79-31, *Minority Institutions Science Improvement.*

LOCAL COURSE IMPROVEMENT

Local Course Improvement (LOCI) awards are made on a competitive basis for individual or small groups of science faculty members to make relatively short-term concentrated efforts at changing their undergraduate science instructional programs. The program is intended to provide a grant mechanism and consequent motivation for quality undergraduate science teaching analogous to that already in existence for quality research. The specific objectives of LOCI are:

- to insure that institutions have the capability for introducing undergraduate students to currently important scientific or technological developments, and for developing improved approaches to the presentation of scientific concepts and applications;
- to permit science faculty at 2- and 4-year colleges and universities to revise and improve local instructional programs in a timely manner; and
- to improve the pre-service training of prospective teachers of science and mathematics through the modification of specific courses (emphasizing both science content and pedagogy) by individual faculty.

Projects typically concentrate on the design, preparation, and evaluation of new materials or laboratory experiments. Projects may focus on any undergraduate instructional activity in science, including courses intended for science majors, nonscience majors, those preparing specifically for careers as teachers of elementary and secondary school science, or students preparing for technological careers.

Proposals under the program will be accepted from any university, 2- or 4-year college, or formally organized consortium of these institutions in the United States or its territories that offers instruction in the sciences at the undergraduate level. The Local Course Improvement program seeks a broad distribution of awards nationally and across the variety of scientific and engineering disciplines.

Since LOCI is intended to provide assistance to institutions in improving their own programs of science education, or in enhancing their own capabilities to conduct such improvement activities, recipients of NSF support under this program will be required to contribute to the overall project costs. Institutions may request the Foundation to supply up to 2/3 of the total costs of a project, but in no case will the NSF award exceed $25,000. The total cost is limited to $40,000. In FY 1978, 135 awards were made totalling $2.25 million.

Request brochure SE 79-34, *Local Course Improvement.*

INSTRUCTIONAL SCIENTIFIC EQUIPMENT

The purpose of the Instructional Scientific Equipment Program (ISEP) is to facilitate the implementation of a well-planned new or improved undergraduate instructional program in one or more of the sciences by providing matching support for the purchase of necessary scientific equipment. It should be emphasized that instructional improvement is not restricted to formal courses and laboratories traditionally associated with undergraduate instruction. Projects to improve honors programs, undergraduate student research, and independent study are also eligible, as are those designed to improve programs in technician or pre-service science teacher education or to initiate or improve undergraduate level instruction aimed at acquainting nonscience majors with methods and principles of science and/or the impact of science and technology on society.

Universities and 2- and 4-year colleges in the United States or its territories that offer undergraduate science instruction are eligible for support. Consortia of such institutions are also eligible. Grants are made on a matching funds basis in which the grantee provides at least 50 percent of the cost of the equipment. NSF will supply up to $20,000 per award. In FY 1978, 352 awards were made, totalling $3.5 million.

Request brochure SE 79-32, *Instructional Scientific Equipment.*

INFORMATION DISSEMINATION FOR SCIENCE EDUCATION

The Information Dissemination for Science Education Program (IDSE) is concerned with bridging the gap which exists between educational product developers and users and is directed toward science education at the elementary and secondary school levels. The last decade has witnessed a proliferation in the development of new materials, practices, and technologies available for use in elementary and secondary schools. The rapid pace at which these materials have been produced has made it difficult for those concerned with science education to carefully examine and evaluate alternatives. The Information Dissemination program provides opportunities for educational decisionmakers such as administrators, subject matter specialists, teacher-leaders, school board members, and other policymakers to make more informed choices. The scope of information dissemination activities may include curriculum and instructional materials, research findings, concepts, processes, and educational technologies pertinent to instruction in the sciences including social science and mathematics at the pre-college level. Activities will develop an awareness and demonstrate alternatives; they will also provide for discussion of design features, intended users, expected costs, advantages and disadvantages, and other relevant information.

Projects are expected to be local or regional, rather than having a national orientation. In addition to making projects pertinent to local needs, a narrow geographic focus is more efficient and will encourage continuing communication between participants and the project staff.

Proposals may be submitted by nonprofit organizations such as: colleges and universities; professional, scientific and educational associations or societies; research institutes and laboratories; and state education agencies. Proposals from school districts will also be considered when unique resources (e.g., experienced staff or equipment and materials of unusual diversity) are available to conduct the projects and where activities would not duplicate mechanisms of information dissemination already available. School districts should consult the Foundation program office before formalizing or submitting a proposal. School districts are encouraged to enter into associations with institutions of higher education in planning for information dissemination projects.

Projects have a funding limit of $30,000 and time limit of 12 months. In FY 1978, $695,000 was awarded for 33 projects.

Request brochure SE 79-33, *Information Dissemination for Science Education.*

RESOURCE CENTERS FOR SCIENCE AND ENGINEERING

The Resource Centers for Science and Engineering Program seeks to expand the options in science and engineering of minority students and students from low income families. This program will assist graduate institutions to increase the number of minority graduate students and minority doctorates in science; to increase the participation in science by students from low income families; to provide minority students with role models and research opportunities with established scientists; and to provide minority faculty with academic research career options to increase their scholarly productivity. In Fiscal Year 1978 one center was supported at $2.8 million.

Resource Centers for
Science and Engineering
Directorate for Science
Education
National Science Foundation
Washington, D.C. 20550

Scientific Personnel Improvement

NSF's Scientific Personnel Improvement programs are designed to meet the following objectives:

- to assure that some of the Nation's most talented graduate students in the sciences obtain the education necessary to become first-line scientific researchers;
- to train or upgrade the scientific personnel specifically needed to help meet identified national needs;
- to promote graduate training in the sciences at institutions that have traditionally served ethnic minorities;
- to provide new knowledge and updating experience for science teachers;
- to expose a small number of the most scientifically talented high school and college students to research activities; and
- to develop and test methods to stimulate the participation in science by women, minorities, and the physically handicapped.

GRADUATE AND POSTDOCTORAL PROGRAMS

Graduate and Postdoctoral Programs provide support for study toward a post-baccalaureate degree in science to a small number of highly qualified graduate students and to postdoctoral students in areas of national needs.

Distinction is made between *fellowship* programs in which individuals apply directly to the program, and *traineeship* programs, in which institutions apply to NSF for funds to support individuals whom they will select.

Graduate Fellowships

This program provides fellowship support to graduate students for study or work toward a master's or doctoral degree in a broad spectrum of scientific disciplines. It is expected that in Fiscal Year 1979 the nationally competitive Graduate Fellowship program will provide approximately 400 new 3-year fellowships, to be awarded to beginning graduate students.

The competition is open only to citizens or nationals of the United States. The Foundation is concerned with the underrepresentation of ethnic minorities and women in the scientific personnel pool and specifically encourages applications from these groups.

Request brochure SE 79-10, *Graduate Fellowships*.

Minority Graduate Fellowships

This program was established in Fiscal Year 1978 to provide fellowship support to members of ethnic minority groups which traditionally have been underrepresented in the advanced levels of the Nation's science talent pool. Under this program, support is provided to minority graduate students for study or work toward master's or doctoral degrees in science fields supportable by NSF. It is anticipated that approximately 50 new 3-year Minority Graduate Fellowships will be awarded in FY 1979.

Competition in this program is open only to citizens or nationals of the United States who are American Indian, Black, Eskimo or Aleutian, Mexican-American, or Puerto Rican.

Request brochure SE 79-12, *Minority Graduate Fellowships*.

National Needs Postdoctoral Fellowships

This program assists in providing training to recent postdoctoral scientists and engineers to strengthen their research capabilities in areas of national need. Fellowships will be awarded on the basis of demonstrated aptitude and potential for research related to national needs. Fellows will receive stipends to allow them to undertake up to a year of research or advanced study. It is anticipated that approximately 45 new fellowships will be awarded in FY 1979.

The competition is open to citizens or nationals of the United States who have received their doctorates within the past five years.

For program information, request brochure SE 79-13, *National Needs Postdoctoral Fellowships*.

Minority Institutions Graduate Traineeships

To improve the access of graduate students attending predominantly minority colleges and universities to careers in science and technology, this program anticipates awarding approximately 45 3-year graduate traineeships distributed among those minority institutions that offer the master's or higher degrees in the sciences. The grants to provide traineeship support are made to institutions. The grants provide stipends for the graduate students to be appointed and allowances to the institutions to help in defraying the educational costs involved. A student stipend for 12 months is $3,600; an institutional allowance for 9 or 12 months is $3,400.

The competition is limited to U.S. institutions which have student enrollments which are more than 50 percent Black, Native American, Spanish-speaking, or other ethnic minorities who are underrepresented in science, and confer master's-level degrees in at least one of the fields of science supported by the Foundation.

After announcement of awards, graduate students seeking support under this program should apply directly to the awardee institutions, not to the National Science Foundation. As is the case for other NSF fellowship and traineeship programs, appointments will be made only to persons who are citizens or nationals of the United States.

Write for brochure SE 79-15, *Minority Institutions Graduate Traineeships*.

NATO Postdoctoral Fellowships in Science

In order to promote the progress of science and to assist in obtaining a closer collaboration among the scientists of various nations, the North Atlantic Treaty Organization sponsors a program of NATO fellowships. At the request of the Department of State, the Foundation administers this program for NATO. Awards are made to U.S. citizens for full-time postdoctoral study in science in countries that are members of NATO (other than the United States) or in other countries which cooperate with NATO. Approximately 50 awards will be made in Fiscal Year 1979 to outstanding individuals who have recently received (or will soon receive) doctoral degrees in science. This program is designed primarily for applicants who have received their doctorates within the past 5 years.

The stipend for a NATO Postdoctoral Fellow is $11,040 for 12 months; for 9 months it is $8,280 ($920 per month). Normally a Fellow is provided with some dependency allowances according to his/her status as of the award date. An allowance normally is available to aid in defraying the costs of travel to begin tenure, and upon completion of tenure, to return to the Fellow's residence or the place from which the application was filed.

For the program announcement, request brochure SE 79-17, *NATO Postdoctoral Fellowships in Science*.

Travel Grants for NATO Institutes

The Foundation awards travel grants to enable young U.S. scientists to attend certain NATO Advanced Study Institutes. These meetings are usually held during the summer and vary in length from 1 to 8 weeks. Grants normally cover the cost of the round-trip air fare involved. The directors of the NATO Advanced Study Institutes nominate U.S. citizens for these awards from among those accepted to their institutes. Therefore, indivduals should make their interest in a NATO Travel Grant known to the director of the institute to which they have been admitted. Lists of institutes receiving such support are available from the Foundation in early March, at which time information about application procedures will be made available. In FY 1978, 70 grants were awarded.

FACULTY IMPROVEMENT PROGRAMS

The Faculty Improvement Programs provide support for both pre-college and college teachers to receive additional training or research experience in their fields. Opportunities for elementary and secondary school science teachers include summer and academic year activities conducted in cooperation with local and regional college and university faculty. Opportunities for college faculty include short courses and fellowship-like activities in support of research and study in academia or industry.

College Faculty Short Courses

This program provides a forum in which scholars at the frontiers of various disciplines communicate recent advances in their fields directly to college teachers of science. The primary aim is to enable college-teacher participants to keep their teaching up-to-date and relevant.

To meet this objective the Foundation supports

Chautauqua-Type Short Courses which are conducted by the American Association for the Advancement of Science, the University of Missouri—Kansas City, and 15 regional field centers at which the courses will be held. Approximately 136 courses will be offered in the 1978-79 series. Each course meets for a total of four days—two in the fall and two in the spring. Between the two sessions participants work on course-related projects, designed to enhance the teaching techniques of participants. Courses are open to science, engineering, and mathematics teachers of undergraduate students. A qualified teacher may apply at any field center. Selection of participants is carried out by the field center coordinators. Registration is limited to 20 teachers per course.

Through grants to the field centers, NSF provides lodging for participants in each class for four nights on a double occupancy basis. Participants or their institutions pay the costs of travel, meals, and incidental expenses. The University of Missouri-Kansas City, through a contract with NSF, provides course directors with an allowance of $15 per participant for instructional materials.

Information about these courses may be obtained by writing:

Chautauqua-Type Short Courses
Box B, AAAS
1776 Massachusetts Ave., N.W.
Washington, D.C. 20036

Pre-College Teacher Development In Science

The Pre-College Teacher Development in Science Program is designed for the continuing education of elementary and secondary school teachers of mathematics and the natural and social sciences.

The major objectives of the program are:

- to improve teachers' knowledge of the subject matter of science; and
- to develop and maintain communication and cooperation between scientists at colleges and universities and teachers in elementary and secondary schools.

A wide variety of projects have been supported in this program in previous years. While all projects subscribe to the major objectives of the program, many projects have at the same time responded to particular special local, regional, or national needs identified by the proposers. Such special components have included, but are not limited to, improvements in science education teaching strategies, relating the teaching of science to the learning processes of students, the science education required to enhance the flow of women and minorities into science careers, and the ethical issues posed by the interaction of science with society.

Support is provided to colleges and universities, that offer at least a baccalaureate degree in science, to conduct academic year seminars and summer workshops. Projects are characterized, in general, by a group of elementary and secondary school teachers engaged in a learning experience sponsored by the grantee institution and staffed by individual faculty or others selected for their appropriate expertise.

The maximum funding for a project is $50,000; the maximum time is 12 months. In FY 1978, $6.6 million supported 251 projects.

Request brochure SE 79-27, *Pre-College Teacher Development in Science.*

Science Faculty Professional Development

This program is designed to help experienced, full-time 2-year and 4-year college and university science teachers, who are involved primarily in undergraduate science instruction, to increase their competence in science, so as to improve the capability of science students in meeting current employment requirements. In implementing this goal, awards will be offered to United States college science teachers to pursue research or study at institutions of higher education or in industrial or other nonacademic laboratories in the United States or abroad. Awardees must be citizens or nationals of the United States.

The Foundation will provide a stipend and a travel allowance to the grantee, and an Activities Support Allowance to the institution or organization of affiliation. Stipends are intended to allow the grantee to undertake a full-time activities program during the tenure period. Stipends are calculated on a salary-matching basis. In FY 1978, 127 teachers were awarded grants totalling $2.1 million.

Request brochure SE 79-28, *Science Faculty Professional Development.*

STUDENT-ORIENTED PROGRAMS

Student-Oriented Programs have three related goals: (1) to provide talented students with science learning opportunities beyond those normally available in formal science programs in schools and colleges; (2) to increase the variety of instructional patterns, by demonstrating the capacity of students to accept greater responsibility for planning and carrying out their own learning activities; and (3) to identify and encourage science and engineering talent.

Through each of three separately described programs—Student Science Training, Undergraduate Research Participation, and Student-Originated Studies—support is provided for projects that encourage students to develop their ability to operate more independently and assume greater responsiblity for their own learning.

Student Science Training

The Student Science Training Program (SST) supports projects which involve instruction, research participation, or an appropriate blend of the two, through which highly talented secondary school students come into direct contact with college teachers, research scientists, or engineers for an eduational experience that goes beyond those normally available in high school or early college courses. Most projects are conducted during the summer high school vacation period, but academic year projects with the same objectives and substantially equivalent course content will be given equal consideration.

SST provides funds to defray operating costs plus subsistence of those students whose families are unable to assume these expenses.

SST supports projects that are designed for students with either excellent or limited educational backgrounds. More emphasis will be placed on projects oriented primarily toward students with limited educational backgrounds in FY 1979. Some additional funding is expected to be available for projects expressly designed for students from ethnic groups that have been historically deprived, or for students with significant physical handicaps. A project must be designed for one or the other, but not both, of these categories of students.

Two-year and four-year colleges, universities, and nonprofit institutions with appropriate scientific and educational expertise are eligible for SST project support. In FY 1978, 150 projects were supported at a cost of $2.4 million.

Request brochure SE 79-20, *Student Science Training Program.*

Undergraduate Research Participation

The program of Undergraduate Research Participation (URP) provides support to colleges and universities to bring talented and promising undergraduate students into scientific and engineering research activities. The objective of URP is to provide selected undergraduate students with firsthand experience in the research process by allowing them to work directly with science faculty or industrial scientists on a collaborative basis. URP especially seeks to involve students from colleges without substantial established research programs.

The National Science Foundation will consider proposals for URP projects in baccalaureate science and engineering degree-granting departments. These proposals should be prepared and submitted by science and engineering faculty members who, in the event of award, would select the student participants and manage the research projects. URP projects may be in any field of science supported by NSF.

During FY 1978, awards were made for 148 projects, including 13 projects specifically designed for minority students, at a cost of $1.99 million.

Request brochure SE 79-21, *Undergraduate Research Participation.*

Student-Originated Studies

The aim of Student-Originated Studies (SOS) is to provide teams of college students with experience in independent, self-directed study, and to demonstrate the effectiveness of such study as an adjunct to or replacement for portions of their traditional formal course work.

Each study is conducted by a group of students comprised primarily of undergraduates. Each project deals with a local problem that has immediate relevance to the community. The projects are wholly student-originated and managed, with faculty in an advisory role. There is a general requirement that studies be conducted by multidisciplinary groups and be concerned with problems of the physical, biological, or social environment.

Baccalaureate degree-granting colleges and universities agreeing to serve as host and fiscal agent for the project are eligible for support. All other organizations are ineligible.

Financial support falls into three general categories: stipend support for participants may be requested at a rate not to exceed $90 per week, up to a maximum of 12 weeks; operating expenses (average $700/student); and indirect costs of the host institution. In FY 1978, 65 projects were supported at a cost of $87,000.

Request brochure SE 79-22, *Student-Originated Studies.*

MINORITIES, WOMEN, AND THE PHYSICALLY HANDICAPPED IN SCIENCE

The Minorities, Women, and the Physically Handicapped in Science Program seeks to increase the entry or re-entry into scientific careers of women, and the entry of minorities and the physically handicapped.

Women in Science

The objective of the Women in Science Program is to develop and test methods to attract women to and retain them in science careers. In Fiscal Year 1979 proposals will be supported for Science Career Workshops. The specific objectives of the workshops are to counsel and give practical career advice to women who are undergraduate or graduate students in science. These are to be 1 or 2 days in length, multidisciplinary, and carried out by colleges and universities.

The Foundation will consider other proposals designed to accomplish the primary objectives of this program provided (1) the proposal is received before the deadline specified in SE 79-26, and (2) the proposal is judged highly meritorious, relevant, timely, and cost-effective. In FY 1978, the Women in Science program awarded approximately $1 million to 33 projects.

Request brochure SE 79-26, *Women in Science.*

Minorities in Science

The objective of this program is to provide individual minority students with additional special science learning opportunities. The funding of minority-focused projects is accomplished through two existing student-oriented programs—Student Science Training for high school students and Undergraduate Research Participation for undergraduates. Prospective proposers should consult the Student Science Training and Undergraduate Research Participation Programs as previously described in this Guide. Other proposals meeting the primary objective of this program will be considered if received prior to the deadlines specified for SST and URP and if judged to be highly meritorious, relevant, timely, and cost-effective.

Physically Handicapped in Science

As a result of a new effort to increase the representation of the physically handicapped in scientific research and education, communications have been established with institutions having experience in this area, and proposals are being solicited.

Proposals may be submitted by colleges, universities, schools for the handicapped, and nonprofit organizations.

Priority will be given to four types of projects: (1) conferences, (2) workshops, (3) studies, and (4) science training models which directly involve groups of handicapped students. Guidelines for the preparation and submission of proposals may be requested directly from the Physically Handicapped in Science program.

Write to:

Minorities, Women, & Physically
Handicapped in Science
Directorate for Science Education
National Science Foundation
Washington, D.C. 20550

Science Education Development and Research

Science education should continually renew itself to keep pace with new scientific knowledge, to deal with new conceptions of what knowledge is most important, and to utilize new understanding of the learning process. The goal of the Division is to promote this renewal process and thereby enhance the quality of science education. To this end the Division supports research projects designed to generate new knowledge about the science education process; development projects designed to produce, test, and evaluate innovative science instruction; and needs and problem analyses. Projects are limited to study in the areas of natural and social sciences, mathematics, and engineering. Only projects that promise to improve science education in a national sense will be considered for support.

RESEARCH IN SCIENCE EDUCATON

The goal of the Research in Science Education (RISE) Program is to improve the quality of science education through the creation and synthesis of new knowledge. This program, therefore, supports research projects that will ultimately result in more effective science education or more efficient use of educational resources.

Consideration will be given to projects intended to help define areas in which development and research are needed and to those which provide a knowledge base for solving science education problems. The program's interests include projects focusing on continuing education for scientists and engineers, especially those using technology in the delivery of continuing education.

Special emphasis will be given to research efforts that build an organized systematic base of knowledge in the following areas:

1. Science Education in Early Adolescence.
2. Science for Women, Minorities, and Handicapped.
3. Technology in Science Education.
4. Science Literacy.
5. Cognitive Processes and the Structure of Knowledge in Science and Mathematics (see NIE-NSF Program below).

Proposals are invited from U.S. academic or nonacademic, profit or nonprofit organizations or combinations thereof. The anticipated funding level for RISE in FY 1979 is $3.85 million.

Specific information about this program will be contained in brochure SE 79-55, *Research in Science Education*. However, it is not necessary to obtain this brochure before submitting a brief, informal preliminary proposal to the program office.

JOINT NIE-NSF RESEARCH PROGRAM IN COGNITIVE PROCESSES AND THE STRUCTURE OF KNOWLEDGE IN SCIENCE AND MATHEMATICS

This program, administered in collaboration with the National Institute of Education, supports research aimed at understanding the process of achieving mastery of an area of scientific or mathematical knowledge or a scientific or mathematical skill. Projects eligible for this program will be necessarily interdisciplinary in nature, requiring expert knowledge of a scientific subject, sophistication in the methods and principles of cognitive psychology, and experience with instruction at the appropriate level. Projects should focus upon topics which are of recognizable importance in science and mathematics for students in the age range from elementary school to introductory college level. Activities such as curriculum or test development, literature surveys, program operation, or dissemination (such as conferences) are *not* eligible for support except as necessary for the conduct of research which *is* eligible under the program.

Proposals are invited from U.S. academic or nonacademic, profit or nonprofit organizations or combinations thereof. Foreign investigators may also submit proposals. In FY 1978, 11 proposals were granted, totalling $1 million.

Specific information about this program will be contained in brochure SE 79-53, *Joint NIE-NSF Research Program*.

DEVELOPMENT IN SCIENCE EDUCATION

The goal of the Development in Science Education (DISE) Program is to improve the quality of science education through the creation of new science instructional materials and delivery modes. The program provides funding to originate, develop, and experiment with new ideas having potential for improving science education—aimed at any level and designed for any group of people. The objectives in any particular year may be more limited so as to focus resources on specific types of activity, populations, or disciplinary areas selected for their national importance or timeliness. Five such areas will be emphasized during FY 1979:

1. Science Education in Early Adolescence.
2. Improving Access to Careers in Science.
3. Science, Technology and Society.
4. New Knowledge and New Skills—Education for Productivity.
5. Technology as Applied to Learning.

Projects may be for the development of specific materials, or for the creation and trial of new educational approaches, either within or outside of a formal academic setting. Single awards may be for 1, 2, or 3 years, but through supplementary awards projects may be extended for a longer term.

Proposals may be submitted by nonprofit organizations engaged in science education activities, such as colleges and universities; professional, scientific and educational associations or societies; research institutes and laboratories; and state educational agencies. Individual schools, school districts, regional subdivisions of a state, for-profit organizations, and their personnel are not eligible for direct grants under this program, but may participate in DISE projects by collaborating with an eligible organization. The anticipated funding level for DISE in FY 1979 is $7.85 million.

Specific information about this program is contained in brochure SE 79-50, *Development in Science Education*.

SCIENCE AND SOCIETY

The integrating focus of the three Office of Science and Society programs grows out of the changing relationship between the scientific and technological communities and the society of which they are part. The increased specialization and institutionalization of science and technology and their pervasive influence on contemporary life have added to a growing concern about the ethical implications and social consequences of these activities. The problem of "accountability" has emerged as a central social issue affecting science no less than government, business, education, and other major institutions. In effect, the implicit social contract that exists between science and society is now in process of renegotiation. It is the distinctive task of these programs to try to bring about greater understanding and facilitation of this process, both among the general public and within the scientific and technological communities themselves and to facilitate informed public participation in the resolution of significant public issues involving science and technology.

In pursuing these tasks the programs seek to respond to questions such as:

> How do the activities of scientists affect our lives? How and by whom are decisions made about the direction of scientific activities and the resources invested in them, and how should these decisions be made in a democratic society? Against what ethical and social standards can and should they be judged? How can citizens who are not scientists participate effectively in public policy decisions with important scientific and technological components?

PUBLIC UNDERSTANDING OF SCIENCE

This program seeks to improve the scope, level, and quality of information about science and technology addressed to the general public, especially with respect to the scientific and technological content of major public issues, and to improve the techniques of distribution and dissemination of information about science and technology to nonscientists.

The Public Understanding of Science Program supports projects that make use of a wide variety of communications techniques and media. Many projects are aimed at special audiences such as minority groups, rural populations, senior citizens, and union members. Increased emphasis will be given in Fiscal Year 1979 to projects designed to raise the quality and breadth of media presentation of scientific and technological events. The nature and implications of alternative technologies of energy, food production, and oceanic resource development are representative of the important policy issues which are given high priority.

Proposals may be submitted by colleges, universities, laboratories, museums, State and local government agencies, professional associations and societies, citizens groups, and other profit and nonprofit organizations interested in improving the public understanding of science.

Preliminary proposals enable the staff to detemine whether a project is relevant to the program's objectives and to provide appropriate assistance to the applicant in the preparation of a formal proposal. Preliminary proposals may be submitted at any time. Formal proposals will be considered three times each year.

In FY 1978, 27 awards were made totalling $2.5 million.

Request brochure SE 79-60, *Public Understanding of Science.*

ETHICS AND VALUES IN SCIENCE AND TECHNOLOGY

The central concern of the Ethics and Values in Science and Technology (EVIST) Program is with the ethical rules and social standards that govern the conduct of scientific and technological activities, including the selection of research priorities and the application of research results. These concerns extend from issues associated with the conduct of individual scientists and engineers and their professional organizations and institutions, to those arising out of the more general interactions of science, technology and society.

The goal of the program is to support projects that will make a significant contribution to refining and enlarging the professional and public debate on these questions. Accordingly, highest priority is assigned to projects that deal with issues of demonstrable importance to nonspecialists in science and ethics, and that include a well-developed plan for disseminating their results to as broad a range of concerned individuals and groups as possible.

The Ethics and Values in Science and Technology Program supports experimental institutes and workshops, national and international conferences and symposia, analytical and case-study research, and the preparation of reference materials.

Proposals may be submitted by colleges, universities, laboratories, industrial firms citizens groups, State and local governments, professional associations, and other profit and nonprofit organizations. Proposals from individuals acting independently of institutional sponsorship will be considered only under exceptional circumstances. Preliminary proposals must precede formal proposals.

Certain proposals may be considered for joint support by EVIST and one or more other programs within the Foundation or in other Federal agencies, particularly the National Endowment for the Humanities. Inquiries to NEH should be directed to:

Program of Science, Technology
and Human Values
Office of Planning
National Endowment for the Humanities
Washington, D.C. 20506

In FY 1978, 16 awards were made totalling $1.3 million.

Request brochure SE 79-62, *Ethics and Values in Science and Technology*.

SCIENCE FOR CITIZENS

The goal of the Science for Citizens Program is to increase the knowledgeable participation of scientists and nonscientists in the resolution of public policy issues involving science and technology. Projects supported by this program are intended to facilitate the interaction of scientists with citizens and citizen groups that ordinarily lack access to scientific and technical information that will help clarify and resolve policy issues having significant scientific and technical aspects.

The program in FY 1979 will conduct three major activities. Public Service Science Residencies (for professional scientists and engineers) are designed to encourage qualified persons to initiate or participate in activities aimed at the resolution of public policy issues involving science and technology. Forums, Conferences, and Workshops, sponsored by citizen groups and other nonprofit organizations, are intended to better inform community debates on policy issues involving science and technology. Planning Studies are intended to enable organizations to investigate how to develop mechanisms to provide scientific and technical assistance on an ongoing basis. In FY 1978, 66 awards were made totalling $1.7 million.

For guidelines on submission of proposals, request brochure SE 79-63, *Science for Citizens Forums, Conferences, and Workshops and Planning Studies*, and SE 79-61, *Science for Citizens Public Service Science Residencies*.

Schedule of NSF Programs for Education in the Sciences—Fiscal Year 1979

This consolidated table presents important time-schedule information concerning NSF programs for education in the sciences. It is intended as a convenient reference for: (1) individuals applying for fellowships or professional development grants and (2) institutions submitting proposals for the conduct of other listed programs and projects. Although application closing dates are firm, award dates are approximate:

INFORMATION FOR INDIVIDUAL APPLICANTS

	Program Announcement Availability	Application Closing Dates	Award Announcement Dates	Pertinent Publication
FELLOWSHIPS				
Graduate, Academic Year 1979-80	Sept. 1978	Nov. 30, 1978	March 1979	SE 79-10[2]
Minority Graduate Fellowships	Sept. 1978	Dec. 8, 1978	March 1979	SE 79-12[2]
National Needs Postdoctoral Fellowships	Sept. 1978	Nov. 3, 1978	Feb. 1979	SE 79-13[2]
North Atlantic Treaty Organization (NATO)[1] Postdoctoral Fellowships	Sept. 1978	Nov. 3, 1978	Feb. 1979	SE 79-17
PROFESSIONAL DEVELOPMENT GRANTS				
Science Faculty Professional Development Program	Aug. 1978	Dec. 4, 1978	April 1979	SE 79-28

NOTE: Because the dates above are subject to change, prospective applicants should consult specific program announcements for exact final dates.

INFORMATION FOR INSTITUTIONS SUBMITTING PROPOSALS

(NOT for Individuals Applying for Participation)

	Program Announcement Availability	Proposal Closing Dates (receipt in NSF)	Grant Award Dates	Pertinent Publication
DIVISION OF SCIENTIFIC PERSONNEL IMPROVEMENT				
Minority Institutions Graduate Traineeships	Sept. 1978	Jan. 12, 1979	April 1979	SE 79-15
Pre-College Teacher Development in Science	Aug. 1978	Oct. 15, 1978	March 1979	SE 79-27
Student-Oriented Programs				
Student-Originated Studies	Sept. 1978	Nov. 10, 1978	March 1979	SE 79-22
Student Science Training	July 1978	Sept. 22, 1978	Jan. 1979	SE 79-20
Undergraduate Research Participation	July 1978	Sept. 15, 1978	Jan. 1979	SE 79-21
Women in Science	Sept. 1978	Dec. 1, 1978	May 1979	SE 79-26
DIVISION OF SCIENCE EDUCATION RESOURCES IMPROVEMENT				
Comprehensive Assistance to Undergraduate Science Education	July 1978	Dec. 4, 1978	May 1979	SE 79-30
Information Dissemination	Aug. 1978	Jan. 10, 1979	June 1979	SE 79-33
Resource Centers for Science and Engineering	To be announced	To be announced	To be announced	To be announced
Minority Institutions Science Improvement	July 1978	Dec. 4, 1978	May 1979	SE 79-31
Instructional Scientific Equipment	Nov. 1978	March 2, 1979	Sept. 1979	SE 79-32
Local Course Improvement	July 1978	Oct. 3, 1978	April 1979	SE 79-34
DIVISION OF SCIENCE EDUCATION DEVELOPMENT AND RESEARCH				
Development in Science Education (DISE)	Aug. 1978	Nov. 30, 1978[3]	Aug. 1979	SE 79-50
Research in Science Education (RISE)	Nov. 1978	Open	Open	SE 79-55
NIE NSF Research Program	Oct. 1978	To be announced	To be announced	SE 79-53
OFFICE OF SCIENCE AND SOCIETY				
Ethics and Values in Science and Technology	July 1978	Dec. 1, 1978 Apr. 1, 1979 Aug. 1, 1979	Open	SE 79-62
Public Understanding of Science	Aug. 1978	Dec. 1, 1978 Apr. 1, 1979 Aug. 1, 1979	Open	SE 79-60
Science for Citizens				
Forums, Conferences and Workshops and Planning Studies	Nov. 1978	Jan. 15, 1979[3] July 15, 1979[3]	Aug. 1979	SE 79-63
Public Service Science Residencies	Nov. 1978	Feb. 1, 1979	June 1979	SE 79-61

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[1] Program administered by NSF for U.S. citizens at the request of the Department of State.

[2] To obtain brochure, contact: Fellowship Office, National Research Council, 2101 Constitution Avenue, N.W., Washington, D.C. 20418; for all other Guides: Mail, Security and Records Section, Attention Publications Unit, National Science Foundation, Washington D.C. 20550.

[3] Preliminary Proposals: request publications separately and by number.